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SYNTHESIS OF BIPHASIC CALCIUM PHOSPHATE GRANULES UNDER STATIC AND ROTATING CONDITIONS FROM ENVIRONMENTALLY BENIGN PRECURSOR - GYPSUM

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Synthetic calcium phosphates (CaPs) are effective biomaterials for bone regeneration due to their similarity to the inorganic component of bone and specific biological properties such as osteoinductivity, osteoconductivity, and biodegradability. An ideal synthetic substitute for implantation should serve as a temporary scaffold, gradually degrading as part of the osseous tissue remodeling process. This degradation involves the release of calcium and phosphate ions, facilitating the replacement of the scaffold by newly formed bone. Achieving appropriate degradation kinetics is crucial for bone regeneration, aligning with the rate of new bone formation to enhance healing and minimize complications. Biphasic calcium phosphate, a widely used CaP-based biomaterial, offers flexibility in adjusting biodegradability by incorporating two distinct CaP phases in varying concentrations [1].

In the present work, biphasic calcium phosphate granules, consisting of various amounts of magnesium whitlockite and carbonated hydroxyapatite phases, were synthesized via a low-temperature dissolution-precipitation process under static and rotating conditions using gypsum as a starting material. Powder XRD patterns, FTIR spectra, N_2 adsorption-desorption isotherms, and SEM images were obtained for the samples.

[1] A. Guliani et. al., Integrated 3D Information for Custom-Made Bone Grafts: Focus on Biphasic Calcium Phosphate Bone Substitute Biomaterials, International Journal of Environmental Research and Public Health 17(14), 4931 (2021)